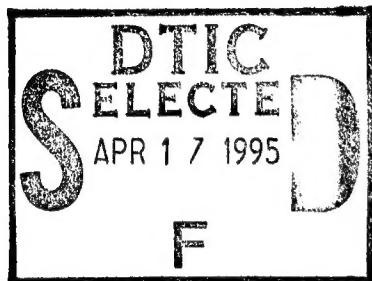


NAVAL WAR COLLEGE  
Newport, R.I.

OPERATIONAL PLANNING AND LOGISTICAL SUSTAINMENT:  
THE AXIS EXPERIENCE IN TWO NORTH AFRICAN OFFENSIVES



by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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16 June 1995

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DTIC QUALITY INSPECTED 5

(UNCLASSIFIED)

Security Classification This Page

REPORT DOCUMENTATION PAGE

1. Report Security Classification: UNCLASSIFIED			
2. Security Classification Authority:			
3. Declassification/Downgrading Schedule: N/A			
4. Distribution/Availability of Report: DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED.			
5. Name of Performing Organization: Joint Military Operations Department			
6. Office Symbol: 1C	7. Address: Naval War College, 686 Cushing Rd., Newport, RI 02841-5010		
8. Title (Operational Planning and Logistical Sustainment: The Axis Experience in Two North African Offensives (U)\):			
9. Personal Authors: Patrick A. Tillson, LCDR, SC, USN			
10. Type of Report: Final	11. Date of Report: 13 February 1995		
12. Page Count: 21			
13. Supplementary Notation: A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Joint Military Operations Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.			
14. Ten key words that relate to your paper: Operational logistics, sustainment, Rommel, North Africa, Africa Corps, logistic anticipation, logistic integration, logistic continuity, operational feasibility, supplies.			
15. Abstract: Though General Erwin Rommel won remarkable battles in North Africa, victory at the operational level eluded him except when his plans were logistically feasible. This paper compares and contrasts two of Rommel's offensives with specific attention given to how Axis logistics shortfalls, strengths, and improvements determined the ultimate outcome of these offensives. The evidence suggests that operational logistic weakness, which was discounted by Rommel, led to his failure in the first offensive. Subsequent improvements in Axis logistics support allowed Rommel to succeed during his second offensive. The Operational Logistics lessons learned from Rommel's African Campaign are still pertinent given the trend toward coalition operations in underdeveloped areas. Poor transportation infrastructure, limited host nation support, and the need for secure strategic lift routes characterize these operations and are similar to the logistic challenges encountered by Rommel in North Africa. By including a logistics feasibility check as part of his operational planning the Operational Commander will improve his chances of keeping his plan in the realm of the possible.			
16. Distribution / Availability of Abstract:	Unclassified <input checked="" type="checkbox"/>	Same As Rpt <input checked="" type="checkbox"/>	DTIC Users
18. Abstract Security Classification: UNCLASSIFIED			
19. Name of Responsible Individual: Chairman, Joint Military Operations Department			
20. Telephone: (401) 841-3414/4120	21. Office Symbol: 1C		

Security Classification of This Page\_(UNCLASSIFIED)\_

### Abstract

Though General Erwin Rommel won remarkable battles in North Africa, victory at the operational level eluded him except when his plans were logistically feasible. This paper compares and contrasts two of Rommel's offensives with specific attention given to how Axis logistics shortfalls, strengths, and improvements determined the ultimate outcome of these offensives. The evidence suggests that operational logistic weakness, which was discounted by Rommel, led to his failure in the first offensive. Subsequent improvements in Axis logistics support allowed Rommel to succeed during his second offensive.

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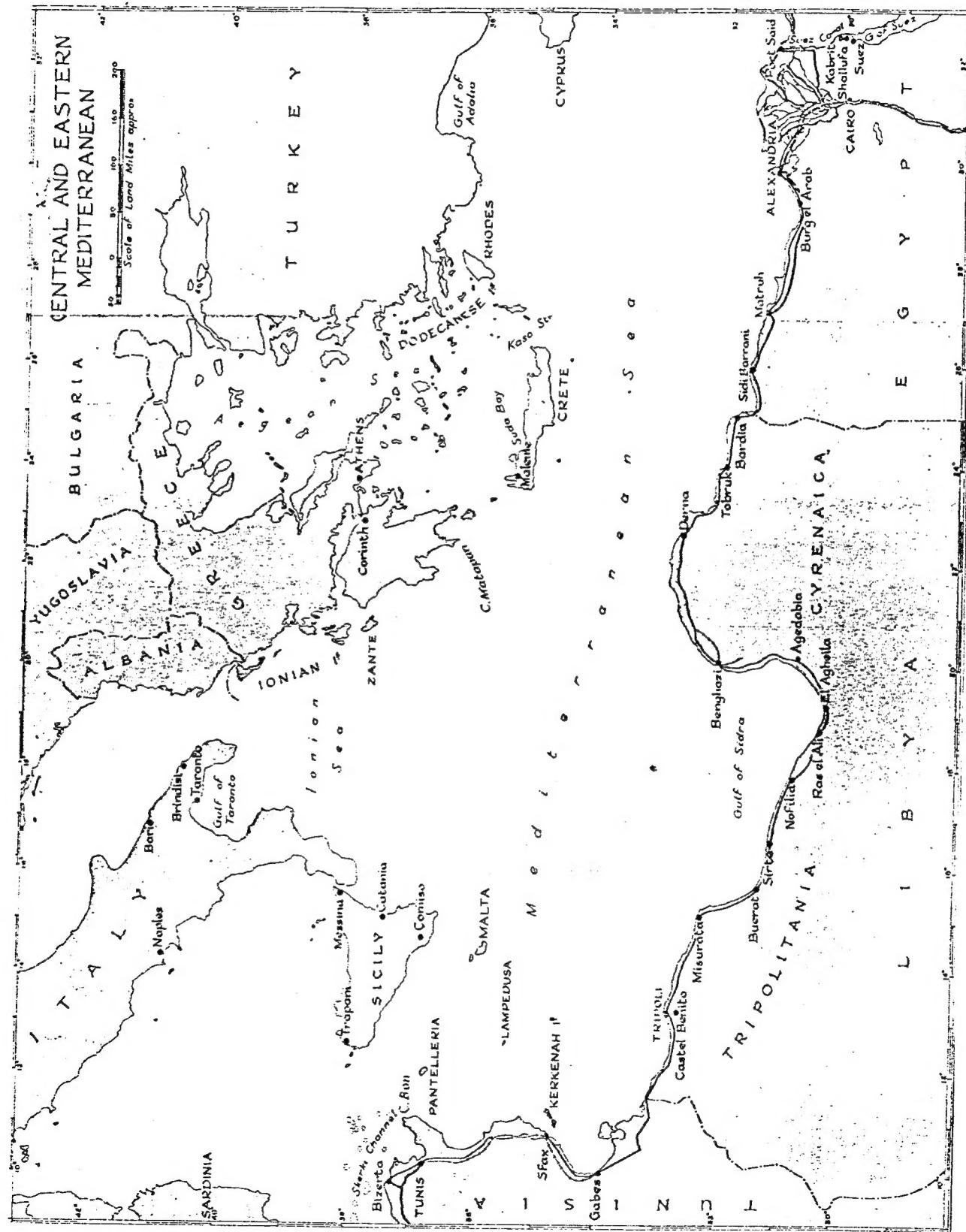
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Introduction. For twenty-five months Erwin Rommel led German and Italian soldiers in one of the most logistically demanding theaters of war in history. Though he won remarkable battles during this period, Rommel was unable to achieve complete victory in North Africa. The gap between tactical and strategic outcomes was primarily the result of strategic constraints beyond Rommel's control. However, at the operational level Rommel's achieved success when his plans were logically feasible. An Operational Commander deploying forces into a logically austere theater would benefit by studying the logistics lessons learned by the Axis in North Africa.

This paper reviews Axis operations during two phases of the North African Campaign with particular attention to how Axis logistics determined the ultimate outcome of these phases. The evidence suggests that though operational logistic weakness led to Rommel's failure in one phase, improvements made in Axis logistics allowed Rommel to succeed in the subsequent phase.

The Axis North African campaign falls into six phases. This monograph focuses on the second and third phases: phase two, (February 1941 to December 1941), hereafter referred to as the "First Offensive" and phase three, (January 1942 to June 1942), hereafter referred to as the "Second Offensive". These two phases were chosen because the opposing forces were relatively equal in strength yet success was split - the British won Phase Two and the Axis won Phase Three. Before analyzing Rommel's actions, some background on the logistics aspects of the theater of operations and North African operations prior to the First Offensive will be discussed.

MAP 1



Theater logistics aspects. Tripoli and Alexandria were the bases of supply for the Axis and British respectively. Between these bases lay a 1,450 mile coastal road, a few useable ports, and little else (Map 1). The majority of land warfare in North Africa during Phases Two and Three occurred in 350 miles of desert and escarpments between El Agheila, Libya and Sollum, Egypt. Having few natural defensive positions or physical barriers to tracked-vehicle movement and containing few human residents, this area was ideal for mobile warfare.

Supplying war in the desert was especially difficult. The scarcity of indigenous supplies required that most be imported. For example, Axis petroleum, the key supply for mobile warfare, was imported from Europe and took up one quarter of the total Axis shipping to North Africa.<sup>1</sup> While fresh water of varying quality was available, it had to be transported to support operations in the majority of the countryside. Finally, weapon and equipment wear was accelerated by desert dust, decreasing transport availability and increasing the requirement for replacement parts.<sup>2</sup>

The infrastructure available to supply Axis troops in Libya was limited. Supplies from Italy had to cross a sea occupied by British warships and patrolled by Malta-based airplanes, to one of three major ports: Tripoli, Benghazi, or Tobruk. Once ashore, these supplies were shipped by truck since only two short railways existed. Rapid, wheeled-transport was restricted to the Via Balbia, Libya's only tarmac road and a vulnerable target.

Prelude to German involvement in North Africa: Italian attack and retreat. In September 1940 eight Italian divisions advanced 55 miles into Egypt against limited British resistance then halted to establish a forward supply depot. Before this project was completed, the British launched a two-

division counterattack. By February 1941 the British had taken 130,000 prisoners and driven the Italians back 540 miles at a cost of 2,000 men.<sup>3</sup> That same month, elements of the "Deutsche Afrika Korps" (D.A.K.), a German two-division corps, offloaded in Tripoli.

Until D.A.K.'s arrival, German involvement in the Mediterranean had been limited to the transfer of Tenth Fleigerkorps to Sicily in December 1940 to support air operations against the Royal Navy.<sup>4</sup> In a German Staff Feasibility Study completed in October 1940, the provision of armored support to Italy was found to be impractical. The study concluded that four Panzer Divisions could take the Suez Canal but that this force could only be logistically supported if Italian forces in Libya were removed.<sup>5</sup> Mussolini determined that this option was politically unacceptable and did not ask for German ground forces until his army was being crushed in Egypt.<sup>6</sup>

The First Offensive. As D.A.K. commander, Rommel was determined to pursue an offense at the first opportunity despite orders to the contrary.<sup>7</sup> Soon after his arrival in Tripoli, he sent Axis troops marching east from their Tripoli encampment. On 1 April 1941, one and a half months later, after overrunning British detachments in El Mugtaa and El Aghelia and a large British force at Mersa Brega, Axis forces were 530 miles east of Tripoli.

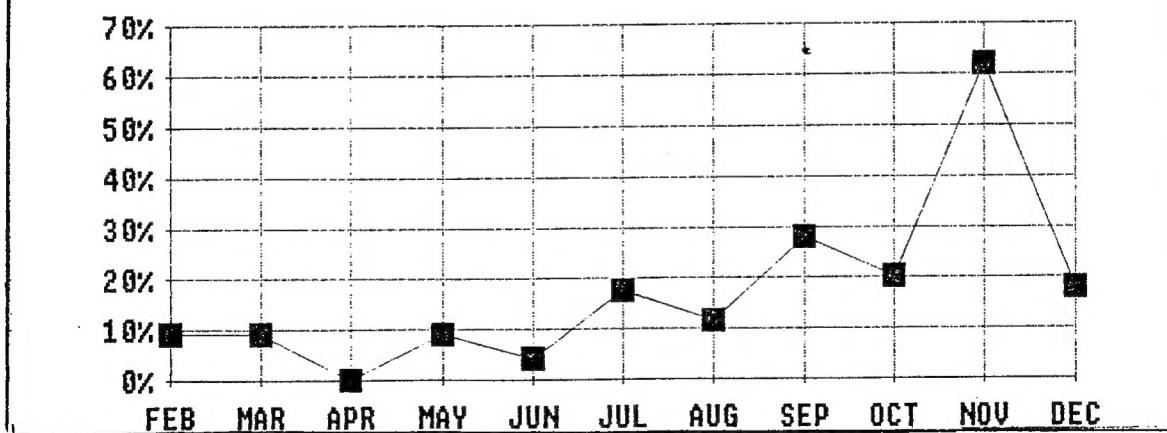
Despite his dramatic advance, Rommel was ordered to comply with his initial defensive instructions. On 19 March 1941, during a situation report trip to Germany, Rommel requested additional supply transport and permission to advance beyond Sirte. He was granted sufficient motor transport to support operations near Sirte but was told to refrain from additional advances.<sup>8</sup> His Commander-in-Chief said that though D.A.K. was too weak to undertake major operations, preparations for a drive on Benghazi and possibly Tobruk the following autumn should commence.<sup>9</sup> Rommel "returned to Africa

with the clearest and most cautious directive from Hitler's headquarters, and proceeded instantly and methodically to disregard it.<sup>10</sup>

In April 1940, D.A.K. advanced to exploit a short-term British weakness.<sup>11</sup> What began as "reconnaissance" expanded into pursuit as D.A.K. defeated British armor in Libya and drove to the Egyptian border in two weeks. Troop exhaustion, overextended supply lines, and tenacious Australians prevented the capture of Tobruk during this rapid advance.

Rommel's supply lines now stretched 1,100 miles to Tripoli and he was ordered to capture Tobruk before advancing further. For seven months Rommel attempted to build up sufficient supplies and to train troops to carry out these orders. His efforts were blocked by three counterattacks and increased shipping losses (Figure 1). Rommel's German/Italian force, redesignated as Panzer Group Afrika, defeated the first two counterattacks. The combination of a third counterattack, "Crusader" (18 November 1941 to 5 December 1941), and supply shortages forced the Panzer Group to retreat.

Figure 1: Percentage of Axis seaborne cargo sunk in transit (FEB 41-DEC 41)



Source: Playfair II, 281. Reed, 93. Braddock, 28. Playfair III, 107.

During the Crusader battles Rommel's Panzer Group disabled or destroyed 800 of the British tanks and lost 94% of its own 412 tanks.<sup>12</sup>

Despite destroying more tanks, the Panzer Group faced a one to six disadvantage in tanks at the beginning of December.

*Crusader* included effective air and sea attacks against Axis supply routes. In November 1940 77% of Axis shipping was sunk and supplies received fell 30,000 tons short of requirements.<sup>13</sup> Based on Panzer Group supply shortages, particularly in ammunition, and the attrition of its armor, Rommel began a series of withdrawals on 6 December 1941 which by 1 January 1942 found his troops at the narrows at Mersa Brega.

The Second Offensive. Axis forces recovered quickly during their retreat. Two new German tank battalions plus additional supplies were received, 13,000 tons of fuel were discovered in Tripoli, and 3,600 tons of fuel were purchased in Tunis.<sup>14</sup> Rommel's shortened lines of communications allowed him to quickly transport these new assets to the front line and to efficiently resupply his Panzer Group.

As 1942 dawned Rommel faced British land and air forces which were worn out or being withdrawn either to refit or for transfer to face the Japanese threat in southeast Asia. Remaining British forces were dispersed in Libya and constrained by a daily 250 ton supply shortfall due to overextended supply lines.<sup>15</sup> Reorganized as Panzer Army Afrika, Axis forces were launched on a spoiling attack to exploit this weakness.

From 21 January 1942 to 6 February 1942 Rommel's attack expanded into a full pursuit which overran British forces between Mersa Brega and Benghazi. The capture of British supplies in Msus and the recovery of Axis stores near Benghazi allowed Rommel to sustain his pursuit until he reached the British defensive line near Gazala. After a three-month lull to rebuild supplies and forces, a resupplied but numerically inferior Panzer Army Afrika began the Battles of Gazala on 27 May 1942.

By 22 June 1942 the Battles of Gazala had been won by Rommel despite a 560 to 994 inferiority in tanks. In the process his Panzer Army captured Tobruk, interred 33,000 prisoners, and acquired 2,000 serviceable vehicles, 2,000 tons of fuel, and large quantities of ammunition.<sup>16</sup> The Second Offensive thus ended with the Axis' recapture of Libya. The following is an examination of the Axis operational logistics factors which determined the result of Rommel's two offensives.

Axis Operational Logistics improvements in North Africa: limited success. "Operational Logistics" encompasses support activities such as force reception, infrastructure development, supply distribution, and the management of material used to sustain campaigns and major operations. Field Manual 100-5 identifies five characteristics exhibited by successful logistics operations: anticipation, integration, continuity, responsiveness, and improvisation.<sup>17</sup> The following pages evaluate how Axis improvements in the first three characteristics led to greater operational success in Africa.

Anticipation: coordinating operations and logistics planning. Logistics anticipation means to foresee or fulfill logistics requirements of future operations. Logistic anticipation results in the accumulation and maintenance of assets and information necessary to support operations in a timely manner.<sup>18</sup> Logistics anticipation inherently requires a good understanding by the logistics staff of their commander's intent regarding future operations. Such understanding allows planning to occur, ensuring that proper support is pushed forward in an efficient manner with a minimum need for improvisation. Axis logistics anticipation improved slightly between the First and Second Offensives.

Within days of their arrival in Libya, the D.A.K. staff was in conflict with its subordinate command caused by a misunderstanding of Rommel's

intent. The D.A.K. staff assumed that operations would consist primarily of defensive action within 300 miles of Tripoli and concentrated on the unloading of ships and clearing of docks at Tripoli. The German Fifth Light Division staff anticipated more extended operations and pressed for the establishment of a forward area supply base. Rommel, perhaps due to the short time he had known them, had given "no inclination ...to his staff of his intentions to drive across the desert."<sup>19</sup> As a result of this misunderstanding, Fifth Light lost time during its pursuit in early April 1941 when it had to improvise its logistics support.<sup>20</sup>

The Italian High Command had greater difficulties anticipating Rommel's logistic needs. Because Rommel "knew from experience that Italian Headquarters [could not] keep things to themselves..." he intentionally withheld information from the Italians Headquarters when he planned his First Offensive.<sup>21</sup>

By Rommel's Second Offensive his logistics requirements were better anticipated as a result of an increase in the size and professionalism of his staff. This change began in June 1941 when General Gause, sent to act as an independent liaison with the Italian General Staff, voluntarily became Rommel's Chief of Staff and merged his 213 man staff<sup>\*</sup> with Rommel's Panzer Group Afrika staff.<sup>22</sup> The result was a staff which was "much better than the old" and better capable of predicting their superiors' operational intent.<sup>23</sup>

Integrating Axis logistics support. Logistics integration includes standardization and interoperability, support operations specialization, and harmonizing operational planning with logistical feasibility.<sup>24</sup> The Axis achieved minor success in this area.

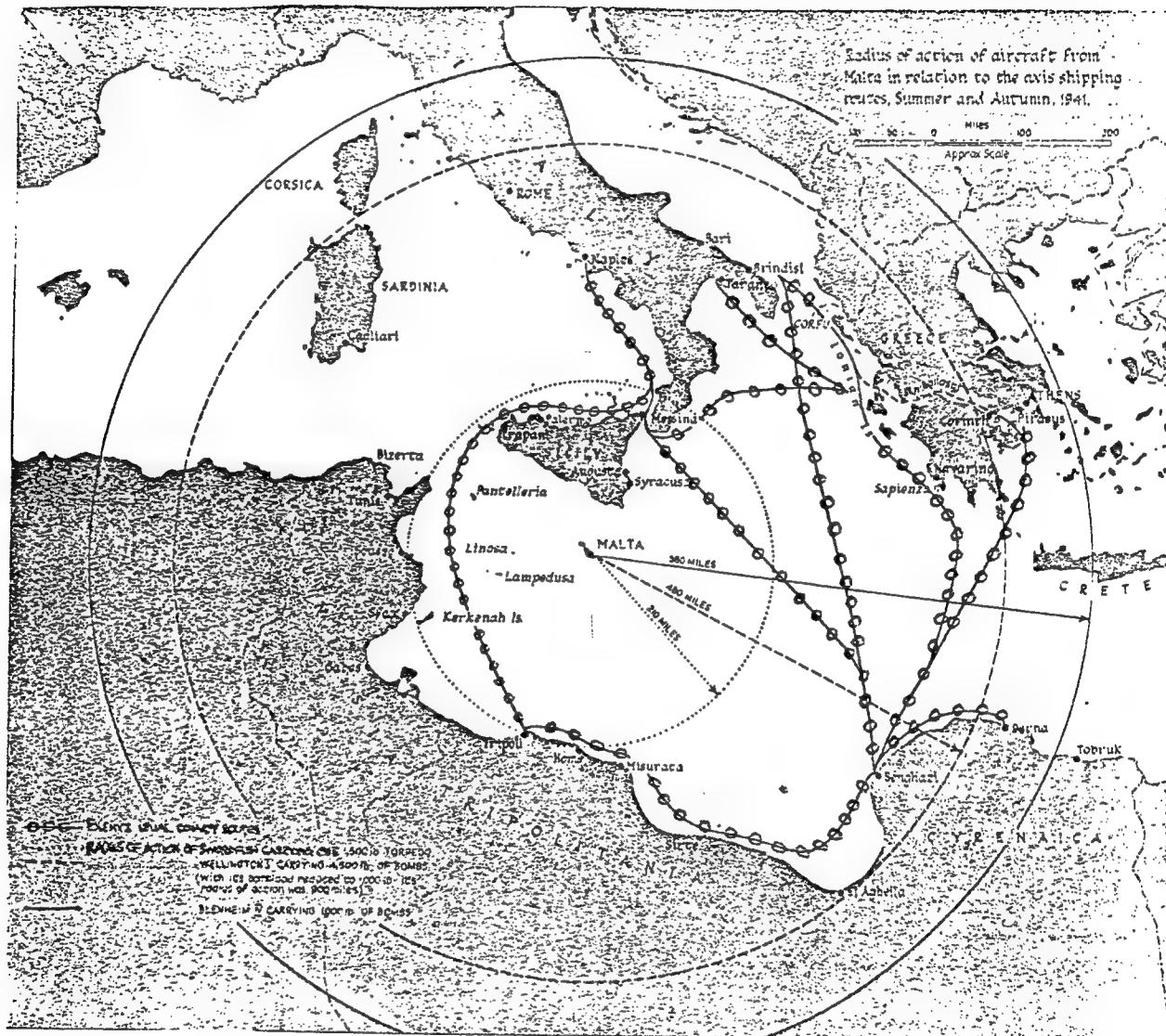
Standardization and interoperability of Axis logistics in North Africa was not achieved. German and Italian equipment was of different manufacture with little interchangeability. Parts standardization was made doubly difficult when captured British equipment was used to replace needed but unavailable Axis equipment.<sup>25</sup> In addition to parts difficulties, German and Italian vehicles ran on different fuels.<sup>26</sup> Finally, most Italian divisions lacked the indigenous motor transport needed for mechanized warfare in the desert.<sup>27</sup>

The Axis achieved better success in support operations specialization. During the North African campaign, Italy provided the bulk of sea-based protection and merchant tonnage shipping. Initially Italian management of this system, especially in cargo prioritization, created intra-Axis conflicts which were aggravated by discord between Rommel and the Italian High Commander.<sup>28</sup> Following the appointment of Field Marshal Kesselring as Commander in Chief South, discord between Axis leaders regarding supply priorities was eased slightly.<sup>29</sup>

The Axis achieved the greatest improvement in Logistics Integration by harmonizing their operational plans with logistics capabilities. During the First Offensive the Axis operational plan did not reflect the logistic challenges posed by either the loss of Tenth Fleigerkorps or the transport requirements of the 1,100 mile supply route. During the Second Offensive, Axis plans were better supported by their logistic posture.

Malta was the key base for interdicting Axis sea lanes to North Africa (Map 2). Axis air operations against this island prior to June 1941 had reduced Malta's effectiveness in this role and only 6.6% of Axis supplies were sunk from February to June 1941.<sup>30</sup> From July to December 1941, following the withdrawal of Tenth Fleigerkorps, Malta revived, Axis shipping

MAP 2



losses climbed to an average of 26.8%, and supplies received fell 32,700 tons short of supplies needed.<sup>31</sup>

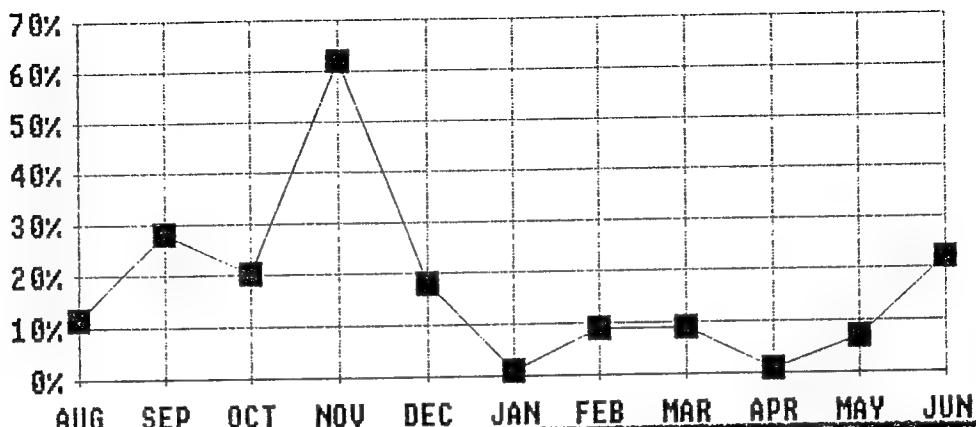
In addition to sinking Axis supplies, revived British air power restricted the debarkation of Axis supplies at Benghazi and forced the Axis to rely exclusively on Tripoli, 600 miles farther west on the Via Balbia. This increased distance significantly increased Axis fuel consumption and decreased the availability of motor transport.<sup>32</sup> The Axis transport system was stretched to the breaking point during *Crusader* when British armored cars and aircraft attacks destroyed numerous trucks and restricted movement by the remaining transport to night time only.<sup>33</sup> Though supplies were available at Tripoli, there was inadequate transport to bring them to the front.

Rommel's Second Offensive was better harmonized with Operational Logistic realities. Improved sea lane security plus a timely operational pause allowed Rommel to accumulate the supplies needed to sustain his offensive.

Sea lane security improved dramatically from January to June 1942 due to improved Axis air and sea power. Second Fleigerkorps was transferred to Sicily in December 1941 to provide Axis sea lane security. At sea, the balance of power shifted in the Axis' favor as German submarines were deployed into the theater and the British Mediterranean Fleet was decimated by losses and transfers to the Pacific.<sup>34</sup>

Increased sea security led to improved Axis logistic support. Axis shipping losses fell to 6.2% and an extra 85,584 tons of supplies reached Africa compared to the previous 6-month period (Figure 2).<sup>35</sup> Another benefit of this additional security was that it allowed Benghazi to be reopened as a major debarkation point within days of its capture during the Second Offensive.<sup>36</sup>

Figure 2: Percentage of Axis seaborne cargo sunk in transit (AUG 41-JUN 42)



Source: Reed, 93. Braddock, 28. Playfair III, 107, 158, 173, 189, and 327.

Though Rommel's supply lines were secure, his shortage of motor transport necessitated that an operational pause occur during his Second Offensive in order for supplies and the non-motorized Italian divisions to catch up. This pause occurred near Gazala, a position which was logically supportable, provided protection of the Axis sea lines of communications, and was defendable.

Compared to the 1,100-mile supply line encountered during the First Offensive, the 280-mile supply line from Benghazi to Gazala presented a manageable transport challenge. This shorter supply line and the 500% increase in supplies processed through Benghazi allowed Rommel to accumulate the supplies needed to defeat the British in Libya and to capture Tobruk.<sup>37</sup>

Possession of the Gazala position also provided operational advantages which aided Axis logistics. Axis possession of Libyan airfields reduced the British air coverage normally provided to Malta-bound convoys, led to an increase in British convoy losses, and delayed Malta's recovery as an anti-shipping base. In addition, the Gazala line was one of the few defendable

positions in Libya, forcing the British to spend months of preparation before launching a counterattack. This delay gave the Axis time to prepare to continue their own offensive.

Providing Axis Logistic Continuity. Key to the concept of Logistic Continuity is providing multiple sources and routes for supplies to reach units requiring them so they do not "become hostage to a single source or mode of support."<sup>38</sup> Axis logistic continuity was expanded by improving port capacity, enlarging supply depots, and modifying shipping methods.

Axis port infrastructure and organization improvements were made which sped up the unloading of ships and reduced ships' exposure to in-port air attack. Port productivity was improved by providing increased anti-air coverage, building air raid shelters near the pier areas, and limiting air raid alarm length.<sup>39</sup> The latter two measures reduced air raid work stoppages from the half day affairs which typified the First Offensive period to fifteen to thirty minute halts. Finally, Italy's best port engineer was hired to ensure these and other efficiency measures were carried out in Benghazi harbor.<sup>40</sup>

The increased flow of supplies to Libya led to an accumulation of six to eight weeks of Axis stocks prior to Gazala battles.<sup>41</sup> This prepositioning of material from Italy allowed the final attack in east Libya to proceed without being interrupted by increased British attacks on Axis convoys.

Finally, shipping method modifications were implemented to improve logistic continuity. During the First Offensive a shortage of shallow bottomed, small draft vessels restricted the Axis' use of Benghazi and smaller ports to the east. This shortfall was partially offset during the Second Offensive through the construction and use of 400 - 600 ton vessels for both trans-Mediterranean and Libyan coastal traffic.<sup>42</sup> In addition, during

peak demand periods, aircraft shuttled up to 200 tons of supplies per day to Libya.

Conclusions: During Rommel's North African campaign, Axis Operational Logistic weakness was partially overcome, spawning Operational success. The greatest improvement achieved by the Axis lay in the areas of Logistics Integration. By matching operations to logistic feasibility, Rommel was able to sustain an advance beyond the tactical level.

The Operational Logistics lessons learned from Rommel's African Campaign are especially valuable given the trend toward coalition operations in underdeveloped areas. Poor transportation infrastructure, limited host nation support, and the need for secure Strategic lift routes characterize these operations and are similar to the logistic challenges encountered by Rommel in North Africa.

While setting high goals to achieve greater performance is a legitimate goal for the Operational Commander, once these goals enter the realm of fantasy and impossibility, their utility is questionable. Many of Rommel's actions in North Africa, while tactically feasible, were not logistically sustainable. This was partially the result of Rommel's philosophy of forcing "the supply staffs to develop their initiative."<sup>43</sup> His Second Offensive shows that where he did have adequate logistic support, his tactical victories could be transformed into operational success. By including Logistics feasibility as part of Operational Planning the Operational Commander will likewise keep his plan in the realm of the possible.

End Notes

- 1 I. S. O. Playfair, The Mediterranean and Middle East Vol.II (London: Her Majesty's Stationery Office, 1956) 281 and I. S. O. Playfair, The Mediterranean and Middle East Vol.III (London: H.M.S.O., 1960) 189, 327. Over 26% of Axis tonnage shipped by sea from June 1941 to October 1941 and again from April 1942 to May 1942 was composed of petroleum products.
- 2 Alfred Toppe, "Desert Warfare: German Experience in World War II" (Garmish: Historical Division, European Command, 1952) 56.
- 3 Warren Tute, The North African War (New York: The Two Continents, 1976) 13.
- 4 Kenneth Macksey, Rommel: Battles and Campaigns (New York: Mayflower Books, 1979) 46 and Walter Warlimont, Inside Hitler's Headquarters (New York, Praeger, 1964) 128.
- 5 Martin Van Creveld, Supplying War (New York: Cambridge UP, 1977) 183 and Warlimont, 120.
- 6 Donald S. Detwiler, gen. ed., World War II German Military Studies Vol. 14 MS#B-495 (New York: Garland, 1979) 30.
- 7 Erwin Rommel, The Rommel Papers (New York: Harcourt, 1953) 101.
- 8 David Irving, The Trail of the Fox (New York: Congdon, 1977) 71.
- 9 Charles Douglas-Home, Rommel (New York: Sunday Review, 1973) 80.
- 10 Ronald Lewin, Rommel (Princeton: Van Nostrand, 1968) 33.
- 11 D. W. Braddock, The Campaigns in Egypt and Libya (Aldershot: Gale, 1964) 30. Rommel, with one German and five Italian divisions, faced two inexperienced and weakened Allied divisions.
- 12 Playfair III, 30 and Braddock, 70-71.
- 13 Samuel W. Mitcham, Jr., Rommel's Desert War (New York: Jove, 1990) 23.
- 14 Van Creveld, 191-192.
- 15 Playfair III, 135.
- 16 Braddock, 107.
- 17 Department of the Army, FM 100-5: Operations (Washington, D.C.: Department of the Army, 1993), 12-3.

18 Ibid.

19 Playfair II, 17.

20 Rommel, 108. On 3 April 1941 the 5th Division, at Agedabia, reported that it would take four days to replenish their petroleum stocks due to the lack of transport and the distance to the supply dump. By unloading all its vehicles (and therefor immobilizing the division) and using this extra transport, the division was able to resupply itself in 24 hours.

21 Ibid, 181.

22 Ibid, 139.

23 Irving, 117.

24 FM 100-5, 12-4.

25 Playfair III, 339. Following the capture of Tobruk approximately 80% of the Axis motor transport consisted of captured British vehicles. This extensive transport fleet deteriorated quickly in the arduous desert environment due to a lack of spare parts.

26 Donald S. Detwiler, gen. ed., World War II German Military Studies Vol. 14 MS#T-3 P1 (New York: Garland, 1979) 17. Italian motor transport used diesel while German trucks used gasoline.

27 Rommel, 102.

28 Irving, 75.

29 Detwiler, 9.

30 Rowena Reed, "Central Mediterranean Sea Control and the North African Campaigns, 1940-1942," Naval War College Review 37 (1984): 93.

31 Creveld, 185 and Reed, 93. Axis forces in Libya needed 70,000 tons of supplies per month and only 317,300 tons of supplies were received.

32 Toppe, 56 and Creveld, 190. Prior to its closure, Benghazi harbor handled 21-24,000 tons of supplies per month. Following Benghazi's closure, this cargo had to be moved by truck the extra 600 miles from Tripoli at an approximate additional expenditure of 4,800 tons of fuel per month and increased transport wear and tear. The extra 1,200 miles added to the round trip to the front represented 14.8% of the average engine lifetime of 8,060 miles in the desert. As a result, 35% of Rommel's vehicles were constantly out of repair.

33 Creveld, 190.

34 Playfair II, 338-339 and Playfair III, 409-411. Transfer of German submarines to the Mediterranean, losses to Axis naval forces, and Royal Navy withdrawals to support the war in the Pacific resulted in the following change in the Order of Battle for the British and Italian Navies from late March 1941 to mid March 1942.

Ship Type	1941		1942	
	British	Italian	British	Italian
Carrier	2	0	2	0
Battleship	4	3	1	3
Cruiser	10	15	6	4
Destroyer	30	39	27	26
Submarine	20	41	25	53*

\*Includes 20 German submarines.

35 Reed, 93.

36 Playfair III, 190.

37 Creveld, 187 and Playfair III, 190. Due to a shortage of coastal shipping to support Benghazi port operations only an average of 500 tons a day could be processed through this port in April 1941. By May 1942 this port was processing 2,500 tons a day.

38 FM 100-5, 12-4.

39 Detwiler, 33-34.

40 Ibid, 40.

41 Toppe, 14.

42 Detwiler, 35 and Irving, 112. Installed anti-aircraft guns on these vessels discouraged enemy air attacks. Their shallow draft also made them immune to most torpedo attacks and allowed them to land supplies at underdeveloped ports or even on beaches near the front lines.

43 Rommel, 96-96.

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